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### What's lacking in online learning?

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## *What's Lacking in Online Learning?* *Dreyfus, Merleau-Ponty, & Bodily Affective Understanding*

**Abstract:** Skepticism about the limits of online learning is as old as online learning itself. As with other technologically-driven innovations in pedagogy, there are deep-seated worries that important educational goods might be effaced or obscured by the ways of teaching and learning that online methods allow. One family of such worries is inspired by reflections on the bodily basis of an important kind of understanding, and skepticism over whether this bodily basis can be inculcated in the absence of actual, flesh-and-blood, classroom interactions (e.g. Heath 1997; Dreyfus 1999, 2008; Ess 2003; Dall’Alba & Barnacle 2005; Maiese 2013). This paper focuses on the ways in which such worries arise in the influential work of Hubert Dreyfus (1999, 2008). The negative conclusion for which I argue is that endorsing Dreyfus’s Merleau-Pontian picture of the relationship between bodily skill and understanding does not commit us to his general pessimism concerning online learning – bodily, emotional, and interactive dimensions might be essential to learning, but we lack reasons to think that online learning necessarily lacks these dimensions. The negative argument motivates a positive claim: rather than giving up on online learning we should focus on designing courses and pedagogies that scaffold the bodily, affective and interactive dynamics constitutive of understanding in a particular domain.

**Keywords:** Dreyfus, Embodied Cognition, Merleau-Ponty, Online Learning, Phenomenology

### *1. Introduction*

Skepticism about the limits of online learning is as old as online learning itself.<sup>1</sup> As with other technologically-driven innovations in pedagogy, there are deep-seated worries that important educational goods might be effaced or obscured by the ways of teaching and learning that online methods allow.<sup>2</sup> One family of such worries is inspired by reflections on the bodily basis of an important kind of understanding, and skepticism over whether this bodily basis can be inculcated in the absence of actual, flesh-and-blood, classroom interactions (e.g. Heath 1997; Dreyfus 1999, 2008; Ess 2003; Dall’Alba & Barnacle 2005; Maiese 2013). This paper focuses on the ways in which such worries arise in the influential work of Hubert Dreyfus (1999, 2008). The negative conclusion for which I argue is that endorsing Dreyfus’s Merleau-Pontian picture of the relationship between bodily skill and understanding does not commit us to his general pessimism concerning online learning – bodily, emotional, and interactive dimensions might be essential to learning, but we lack reasons to think that online learning

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<sup>1</sup> ‘Online learning’ is here intended as a deliberately fuzzy and inclusive term, intended to encompass any mode of learning that substitutes real-time embodied interactions between teachers and learners for asynchronous learner engagement with pre-prepared teaching materials, accessed online. The wide scope of this definition of ‘online learning’ is intended to match up with the scope of Hubert Dreyfus’s critique, explained below. As we’ll see, there are reasons to doubt that this critique hits its target. The last sections of this paper argue that the Phenomenological insights to which Dreyfus appeals can nonetheless inform our thinking about how online resources can be designed and used in a pedagogically effective way.

<sup>2</sup> As Rose (2017) nicely summarises: ‘[the tension]—between the desire of university administrations and technology corporations to improve efficiencies and boost profits by automating instruction, and the impulse of teachers to search for ways to enhance the interactivity and relationality at the heart of the educational experience—is not new to e-learning: similar tensions were also evident in the discourses and maneuverings that attended the early classroom use of film in the 1920s, radio in the 1930s, television in the 1950s, computer-based integrated learning systems in the 1980s, and so forth. Each of these was a top-down, market-driven initiative emerging in part from a drive to replace the human teacher with a machine that could deliver standardized content to a large number of students.’ (pp.373-4)

necessarily lacks these dimensions. The negative argument motivates a positive claim: rather than giving up on online learning we should focus on designing courses and pedagogies that scaffold the bodily, affective and interactive dynamics constitutive of understanding in a particular domain.

The next sections set out the basis of Dreyfus's concerns in detail. For now, here is the basic idea. Dreyfus (Dreyfus & Dreyfus 1985/2014, 1986, Dreyfus 1997; 2002, Dreyfus & Taylor 2015) endorses an Aristotelian model of skill, whereby skillful agents possess fine-grained abilities to recognize and respond to relevant properties of a particular domain. These abilities of recognition and response resist explicit articulation or codification by the skill's possessor, partly because their complex and situation-specific nature outstrips the subject's powers of expression, and partly because of the distinctive way in which these abilities are possessed and exercised. Drawing on the Phenomenology of Heidegger (1926/1962; Dreyfus 1991) and in particular of Merleau-Ponty (1945/2012; Dreyfus 2002, 2004, 2007), Dreyfus argues that possessing the package of abilities that constitutes skill in a particular domain consists in cultivating a specific *bodily* and *affective* relationship to the world.<sup>3</sup> Rather than being a matter of *interpreting* and *reasoning about* the domain in which one is acting, skill consists in embodying dispositions to *feel* the appropriate way in which one should *react* to one's situation. Such embodied skillful understanding is, according to Dreyfus and the Phenomenologists from whom he takes his cue, both primitive and pervasive. It is the bedrock upon which more sophisticated abilities to articulate and infer are built, and is at work in everything we see, do and think. Simply put, Dreyfus's worry about online learning is that it necessarily cuts us off from the bodily and affective relationships to the environment that are the grounds of understanding.

It will emerge in what follows that there is an important overlap between Dreyfus's arguments here and his well-known critique of classical AI (e.g. Dreyfus 1972; 2007). In briefest outline (more below), Dreyfus argued that the approach of early AI researchers neglected the above insights about the situation-specific, uncodifiable and essentially bodily ways in which the intelligent systems we know the best – ourselves – cope with the problems and puzzles our environment sets before us. Classical AI attempted to understand and simulate intelligent problem-solving by designing systems that applied determinate rules prescribing determinate responses to determinate situations, all represented and processed in ways in principle independent of the messy implementational details of embodiment and response. Dreyfus argued that his alternative, Phenomenologically-inspired, model of skillful engagement with one's environment suggests that *our* intelligence is not like this – we'll see why this is so in more detail in the next sections. Dreyfus thus predicted that the successes of classical AI would be limited to isolated and artificially-circumscribed domains, such as (competent) virtual chess-playing, or arithmetical processing. Our everyday capacities to get around in an often recalcitrant and dangerous world, and to respond flexibly and creatively to novel situations depend, he argued, on the kind of indefinitely fine-grained bodily know-how emphasized by Aristotle and Merleau-Ponty, but ignored by the 'cognitivist' proponents of classical AI.

Dreyfus was right – classical AI's successes were indeed limited to a few narrowly-circumscribed domains, and attempts to engineer systems that exhibited even modestly domain-general intelligence, or successfully navigated the real world in real time met with failure. Whilst AI research has amassed many

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<sup>3</sup> 'Phenomenology' here refers to a philosophical methodology that aims to draw general philosophical conclusions from the careful description and analysis of the properties of experience. For example, as we will shortly see, Dreyfus draws on the Phenomenological analyses of Heidegger and Merleau-Ponty to argue that the skill acquisition involves changes in the structure of experience that place limits both on how skills should be conceptualised, and how they might be implemented or inculcated. The capital 'P' of 'Phenomenology' is to distinguish it from 'phenomenology', a technical term philosophers use to denote the felt, or qualitative properties of experience.

impressive achievements in the intervening 40 years, it has done so by considerably expanding the toolkit of its classical ancestors in ways that bring it closer to Dreyfus's alternative paradigm.<sup>4</sup> We took this short historical detour partly because we will soon need to return to Dreyfus's views on what the failure of classical AI reveals about human intelligence in order to clarify his understanding of the emotional structure of learning (§3). For now, we can note that Dreyfus has some history of prescient pessimistic predictions concerning attempted technological innovations that marginalize the role of embodied skill. His Phenomenological analysis of embodied skills and their foundational role in our cognitive lives is deservedly influential. So, when considering the role that embodied interactions play in learning in general, and the upshot this has for online learning in particular, we have reason to give Dreyfus's skeptical views a hearing. His assessment of the prospects of online learning is bleak. Reflecting on what has changed between the publication of the first (2001) and second (2008) editions of *On the Internet*, Dreyfus writes:

most of Chapter Two predicting the failure of disembodied distance learning and ridiculing the enthusiasts who claimed that, thanks to the Internet, an Ivy League education would be available to everyone on the planet and that universities as we know them would disappear had to be scrapped.

However, in a narrative twist sure to surprise many university administrators, he continues:

It is now clear that distance learning has failed. The major universities have given up on it and consider their investments of hundreds of thousands of dollars as sunk costs.  
(Dreyfus 2008, p.xi)

By 2008, Dreyfus was already writing with the conviction that his arguments about the limitations of education at a distance had been vindicated. Whilst estimates of the vitality and trajectory of the e-learning industry vary, it has doubtless enjoyed considerable growth since Dreyfus's pronouncement, and remains a focus for many involved in shaping educational policy and practice (see e.g. Allen and Seamen 2013). What, then, should we make of Dreyfus's critique? If his pessimistic prediction was overstated, might we nonetheless learn valuable lessons from his diagnosis? In what follows, I argue that Dreyfus correctly directs our attention to the importance of embodied interaction in learning, but draws the wrong morals from his reflections. We can keep hold of what is important in his embodied, affective and interactive conception of learning, and use it to inform rather than discard online pedagogy. To understand how and why this is so, we must first equip ourselves with a fuller understanding of his views on embodied skill.

## 2. *Dreyfus on Embodied Skills*

Dreyfus's skepticism concerning online learning (and the transformative potential of online interactions in general)<sup>5</sup> is primarily motivated by his influential model of skill acquisition (Dreyfus and Dreyfus 1985/2017, 1986, Dreyfus 1997; 2002). Informed by his reading of Heidegger and Merleau-Ponty, his Phenomenological critique of AI, and drawing on interviews and testimony of experts from many different domains, Dreyfus argues that adult skill acquisition passes through five stages:

### 1. *Novice*

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<sup>4</sup> See Dreyfus (2007) for a survey of the successes and failures of AI from his perspective.

<sup>5</sup> See (e.g.) chapters one, three four and five of Dreyfus (2008).

Novices learn an *objective, context-independent* way of recognizing and interacting with relevant facts and features of the domain they're trying to master. *Objective* because novices recognize and respond to features in a way available to anyone, regardless of their history of interactions in that domain, or the particular contours of their current experience. *Context-independent* because novices recognize and respond to features in a way that is largely insensitive to ways in which those features might be entangled in broader and more complex webs of significance. Typically, novices respond to situations by applying explicit rules for identifying facts and features relevant to their goals, and for acting upon them in ways usually conducive to achieving those goals.

Novice drivers, for example, apply rules prescribing speeds at which to shift gears; novice chess players apply a rigid schema for assigning point values to pieces to determine when an exchange of pieces is likely to be beneficial. In most (but not all) domains this objectivity and context-dependence sets hard limits on performance. Good drivers know there are many circumstances that can make it appropriate to shift gears at speeds other than the norm; good chess players know there are situations where sacrificing a valuable piece would guarantee victory. Novices are blind to these contextual features and their salience. Lacking a nuanced grasp of their overall task, they assess their performance based on how well they follow the rules supplied.

## 2. *Advanced Beginner*

As experience of coping with real situations accrues, learners come to recognize and respond to salient features of their environment in ways that go beyond those of the novice. Patterns or regularities not captured by determinate rules can be noticed or pointed out and used to inform responses. Dreyfus describes this as learning to recognize *aspects* of a situation, and learning *maxims* that prescribe actions on the basis of such aspects. Drivers might learn to recognize that the vibrations from the engine sound or feel a certain way, and that they should shift gears as a consequence. This represents a progression from novice status since the recognized aspects and the maxims which prescribe action need not be objective, context-independent, or determinate; a maxim guiding advanced beginner gear-changing might be 'shift gears when the vibrations from the engine sound or feel like *this*', where 'like *this*' picks out a subjective aspect of being engaged in a particular motoring context. Similarly, chess players learn to recognize weak pawn structures or king-side defenses, and to respond in light of these, in ways that they need not be able to spell out objectively and determinately.

## 3. *Competence*

In all but the simplest of domains, however, relying on maxims that prescribe responses to perceived aspects places a low ceiling on performance. With greater experience, competent performers learn that domains like chess and driving involve a multiplicity of potentially salient perceptible features, and that the maxims on which they're used to relying can sometimes recommend contradictory responses. The sound of the engine might suggest changing gears, but the icy conditions speak against it; the opponent's fragile king-side defense invites attack, but the means of doing so close off opportunities to develop important pieces. Faced with multiple salient features and conflicting demands, competent performers must consciously adopt a plan or schema in terms of which to view the situation and pursue a course of action – focusing on tire traction over engine sounds, or on pinning the opponent's queen over developing a bishop. Choosing an organizing schema is difficult and important, and can't be done by applying explicit rules (as novices do) or simply applying maxims to perceived aspects (as advanced beginners do).

Crucially for our purposes, Dreyfus and Dreyfus (1986, p.25) stress that this level requires autonomous choice by the performer, and that progressing beyond competence requires a particular kind of

emotional engagement with the activity and its outcome. Rather than proceeding by rote application of pre-specified rules or maxims, performers must exercise autonomy in choosing a schema in terms of which to view the situation. This opens up the possibility of experiencing oneself as responsible for success or failure in a new way, and a new kind of emotional engagement; previously, failure could be blamed on imperfections in the rules applied, or a brute inability to perceive salient features of the situation. Now success or failure depend upon a choice of organizing schema for which the performer is responsible, allowing greater pride in successes and remorse at failures.

#### 4. Proficiency

This emotional engagement needn't necessarily occur for competent performers. In the face of a bewildering array of options they might simply plump (perhaps by flipping a coin) for one interpretative schema over another, feeling no deep emotional connection to the outcome. If things don't work out, they shrug it off with the thought that they did the best they could with the information available; if things go well, they feel that they simply got lucky. But to progress from competence to proficiency, the performer must *own* their successes and failures by *feeling* appropriately about them – brooding over failure and rejoicing at success.

Shortly, we will consider in more detail just how and why emotional engagement might allow progression beyond competence. For now, here's the general idea: Dreyfus claims that emotional engagement paves the way from *deciding* how one should interpret one's situation to simply *perceiving* how it should be interpreted. The proficient performer does not reason towards, or plump for, an interpretative schema – they immediately perceive the situation in light of a schema that strikes them as appropriate. Somehow, the emotionally-laden successes and failures of their learning history conspire to reliably and automatically present things to them from a perspective that seems to make maximal sense of their situation, and to be most conducive to success. As with the advanced beginner, while the proficient performer is perceptually sensitive to the features and patterns that determine the schema she adopts, she need not be able to break those patterns down into independently identifiable constituents, or spell out the patterns to which she is responding.

#### 5. Expertise

The proficient performer automatically adopts the perspective that seems to make maximal sense of their situation, but must still decide what to do in light of how things appear. Not so for the expert, who not only sees and automatically adopts the appropriate perspective, but also automatically sees and takes the course of action which that perspective recommends. Experts can thus directly perceive salient features of their situation in ways unavailable to the novice, automatically adopt an appropriate perspective upon their situation and its demands in ways unavailable to advanced beginners and competent performers, and can be immediately moved by the demands of the situation seen from this perspective unlike the proficient performer. Whilst a proficient chess player automatically adopts a perspective on their situation that renders certain courses of action salient, they must still decide which specific move should be made. The expert chess player directly experiences the situation in terms of what needs to be done.

Dreyfus (2008) adds an extra stage: *mastery*.<sup>6</sup> This is to accommodate the fact that even experts can continue to learn. Miles Davis's status as the world's greatest jazz trumpeter and bandleader didn't prevent the relentless evolution of his style. Rather than stick with combinations of techniques, influences and musicians he had perfected, he continued to innovate, persistently redrawing the boundaries of the field in which he worked. Whilst experts rest content with being the best in their field,

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<sup>6</sup> Most statements of his account of skill stop at expertise, however (e.g. Dreyfus & Dreyfus 1985, 1986; Dreyfus 1997, 2002).

masters are intrinsically motivated to continually evolve and improve – even if that means personally reconstituting the standards of excellence in their domain. Though the distinction between expertise and mastery is a fascinating topic, it won't concern us further here.<sup>7</sup> It's not clear that anyone knows how to teach true mastery, online or off. According to Dreyfus, the problems for online learning arise much earlier – absent embodied, flesh-and-blood interactions with classmates and teachers, he claims, online learners will be stuck at competence at best. Dreyfus claims that these embodied interactions are necessary for the kind of emotional engagement with a domain that allows the progression from competence to proficiency to expertise – hence, any form of distance education is incapable of creating experts. The job of the next sections is to assess (and ultimately reject) Dreyfus's reasons for this claim. First, let's briefly consider and set aside two initial reactions we might have to Dreyfus's claim.

One way of rejecting Dreyfus's pessimistic conclusion would be to reject the model of embodied skill from which it flows. While this is a live option, I set it aside here. In the next section I further articulate and defend the crucial feature of Dreyfus's model – the necessity of emotional engagement for progressing beyond competence. However, the goal of this paper is not to compel acceptance of Dreyfus's influential model, but to understand the implications for online learning *if* that model is accepted.<sup>8</sup> A second reaction would be to dismiss Dreyfus's skepticism as clearly overblown. Of course we can learn things online: in the past week alone I've used online resources to learn how to type an umlaut, cook borscht, and fix my washing machine. But we shouldn't read Dreyfus as committed to the claim that *nothing* can be learned online. Importantly, in each of these cases I learned a rigid way of responding to a determinate situation in the service of some goal, not a flexible, context-sensitive skill. Dreyfus can concede that online learning might be able to inculcate rigid but useful habits, or isolated bits of knowledge; his claim is that it can't foster the kind of flexible and creative engagement with a problem domain that represents human intelligence at its best. My recent online discoveries do not generalize to allow me to type other special characters, to cook related soups or stews, to fix other problems with my washing machine, or the same problem with other washing machines. This suggests a simple, but important, interim conclusion to which we'll return later: when assessing the potential scope of online learning, exactly *what* is being learned – flexible skill, rigid habit, or isolated facts – makes a difference.

### 3. Skill Requires Emotional Engagement

The key claim motivating Dreyfus's pessimism about online learning is that it can't provide the emotional engagement with subject matter and learning context required to progress from competence to proficiency. Most of us know very well, however, that activities online can provoke strong emotional reactions, for better or worse. To assess Dreyfus's claim, then, we need to know more about just what *kind* of emotional engagement is required in learning skills, and why.

Dreyfus is not as clear as he could be concerning this crucial feature of his model. He often writes as if rejoicing in success and brooding over failure simply happens to be part of the mechanism via which

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<sup>7</sup> See Bergamin (2017) for a sophisticated development of Dreyfus's views on the relation between expertise and mastery.

<sup>8</sup> For what it's worth, explicit disagreement with the salient aspects of Dreyfus's model here is rare – perhaps nonexistent. While there is disagreement over exactly how expertise is related to explicit, conceptual understanding (e.g. McDowell 2007, 2013), and the extent to which deliberation and conscious self-monitoring are involved in expert performance (e.g. Fridland 2014; Buskell 2015; Christensen, Sutton & McIlwain 2015; Montero 2016; Bergamin 2017) the key claims that expertise is marked by an increased non-inferential sensitivity to salient features of the domain, and fostered by emotional engagement, have not to my knowledge come under fire in print. Each of the accounts just cited could, I think, endorse the reflections on the emotional structure of learning that will be developed here.

nervous systems like ours adapt themselves in skill acquisition – a mere quirk of neurophysiology. For example:

If the learner takes to heart his successes and failures, the resulting positive and negative emotional experiences seem to strengthen the neural connections that result in successful responses and inhibit those that produce unsuccessful ones, so that the learner's representations of rules and prototypical cases are gradually replaced by situational discriminations (2004/2014, p.233)

Or, more recently:

Neuroscience has established that procedural coping ability is produced by a system of brain areas centered on the subcortical basal ganglia, including cortico-striatal loops with, in addition, connections with limbic areas such as the amygdala. The limbic system provides *reward* signals needed for the experiential reinforcement learning of skill. Reward expressed by the limbic system's secretion of neural modulars [sic], such as dopamine, is the body's emotional response to how an encounter with the world is evolving or has terminated. (Dreyfus and Taylor 2015, p.51(n), original emphasis)

Though the depiction of the relevant neuroscience here is broad-brush, the claim that neural circuits correlated with emotional evaluation and regulation are deeply involved in the neural changes wrought by skill acquisition is well supported.<sup>9</sup> But more important for our purposes are Dreyfus's *Phenomenological* reasons for thinking that emotional engagement is required for skill acquisition; reasons for thinking that reflection on our experience of skillful action reveals emotional engagement as baked into its necessary structure.

To appreciate these reasons, we must return to Dreyfus's arguments about the limits of classical AI. In our survey of Dreyfus's stages of skill-acquisition, we saw that the competent performer is one who has become sensitive to sufficiently many aspects of the problem domain that they must adopt a schema or plan for making sense of the situation in order to avoid being paralyzed by choice in the face of its complexity. The problem faced by the competent performer is similar to what is known as the *frame problem* in AI – roughly, the problem of how to engineer a system that can efficiently keep track of the relevant features of its situation, and consequences of its own activities, while ignoring the mountain of irrelevant facts and implications that are only peripherally involved in attempts to cope with one's environment. Dennett (1984/1998) provides a lucid illustration. Imagine a robot ('R1') programmed for self-preservation, who learns that its only spare battery is in a room with a ticking time-bomb. R1 deduces that it must go to the room and remove the battery before the bomb detonates:

There was a wagon in the room, and the battery was on the wagon, and R1 hypothesized that a certain action [...] would result in the battery being removed from the room. Straightaway it acted, and did succeed in getting the battery out of the room before the bomb went off. Unfortunately, however, the bomb was also on the wagon. R1 knew that the bomb was on the wagon in the room, but didn't realize that pulling the wagon would bring the bomb out along with the battery. Poor R1 had missed that obvious implication of its planned act. (Dennett 1984/1998, p.181-2)

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<sup>9</sup> See Lewis (2015, 2017) for an engaging summary of the cognitive neurobiology of habit learning that comports well with Dreyfus's view.



R1 correctly represented the facts of its situation, but had failed to account for all the relevant implications of its decision. Perhaps, then, R1's successor must work through the implications of its decisions before acting if it is to survive. But when the engineers place a new robot designed to do just this in the same situation:

It had just finished deducing that pulling the wagon out of the room would not change the colour of the room's walls, and was embarking on a proof of the further implication that pulling the wagon out would cause its wheels to turn more revolutions than there were wheels on the wagon – when the bomb exploded. (ibid, p.182)

This robot was doomed by spending valuable time and cognitive resources working through potential effects of its decisions on irrelevant properties of its situation. But when a *third* robot is designed to factor only the *salient* properties of its situation into its deliberation, and placed in the room with the bomb, it simply sits motionless while the timer ticks down.

‘Do something!’ [the engineers] yelled at it. ‘I am,’ it retorted. ‘I’m busily ignoring some thousands of implications I have determined to be irrelevant. Just as soon as I find an irrelevant implication, I put it on the list of those I must ignore, and...’ the bomb went off. (ibid)

The moral of the story is that timely goal-directed activity in an environment of even moderate complexity can't be efficiently achieved via explicitly deducing the consequences of a range of potential actions and choosing among the range of inferred outcomes. How else might effective actions be achieved? The problem suggested by the above example is called the *frame* problem because a natural solution appears to be endowing the decision-making system with a series of ‘frames’ or schemas that simplify choice by pre-specifying the range of situational properties most likely to be of practical relevance – the sort of schema we saw the competent performer adopt, above. Perhaps our robot could be equipped with an ‘imperiled-by-bomb’ schema that focuses its deliberations only on situational properties pertaining to its proximity to the bomb. This strategy, however, merely defers rather than solves the problem. For an intelligent system also needs to solve the problem of which schema to apply to its current situation, and to determine whether its actions will require it to update or change this schema.

How do humans get around the frame problem? Dreyfus, following Merleau-Ponty (1945/2012), argues that we obviate the need to reason our way into skillful activity by acquiring bodily and emotional habits of interaction – or sometimes simply exploiting our innate biological endowment with such habits. Think of the way you experience a sudden scurrying movement glimpsed out of the corner of your eye. Automatically, your attention is pulled towards the movement's source, your pulse spikes, and your body readies itself for action. We don't need to reason our way into an interpretation of the salience of scurrying shapes at the periphery of our visual field. Mother Nature has ensured that their salience comes for free, built into the structure of our experience by way of an automatic connection to bodily and affective response. Acquiring skills, on Dreyfus's model, consists in sculpting one's bodily habits of autonomic and emotional engagement with a domain via repeated interaction. In this way, skilled chess players come to see and react to complex impending threats with the same immediacy and automaticity as our reactions to scurrying shapes.

Understanding the role of emotions in Dreyfus's account of skill acquisition thus involves understanding three interwoven strands of his thinking. His **critique of classical AI** argues that any system attempting to achieve intelligent action in real environments via application of determinate rules to representations of objective properties of the environment will be hamstrung by the frame problem. His **appropriation of Heidegger and Merleau-Ponty** suggests how embodied agents like ourselves avoid the frame problem. Following Merleau-Ponty, we should understand learning in terms of the cultivation of habits of interaction that improve our ability to cope with some problem domain. In turn, we should understand habit acquisition 'as the reworking and renewal of the body schema' (Merleau-Ponty 1945/2012, p.143/177), where one's body schema here plays the role of investing aspects of one's environment and possible ways of interacting with those aspects with a pre-reflective allure or repulsion. This Phenomenological account of the role of bodily and affective experience in intelligent action is what accounts for the crucial step in his **account of skill acquisition**: the transition from competence to proficiency. This transition involves the learner shifting from *deliberately deciding* on a schema through which to approach the situation to *automatically adopting* an appropriate schema. In light of his work on classical AI, the frame problem, and the Phenomenological insights of Heidegger and Merleau-Ponty, Dreyfus thinks that this shift is enabled by the reconfiguration of the body schema through a history of affect-laden interactions with the problem domain. This reconfiguration results in a subset of considerations and possibilities standing out as salient in virtue of the way the learner immediately *feels* about them, rather than in virtue of any explicit deliberation or judgment on their part.

To summarise, then: for Dreyfus, following Merleau-Ponty, bodily attunement to the salient properties of one's environment involves a pre-reflective affective sense of the allure of some courses of action over others. For the skilled chess player, the openings in her opponent's defense show up as inviting; the position of her opponent's bishop relative to her own jammed-up king side pawns shows up as ominous; the pieces or portions of the board peripheral to the game's narrative show up as affectively neutral. This immediate sense of the significant elements of the situation provides the structure for any subsequent deliberation – and, when things go at their smoothest, her moves flow simply and instinctively from this felt significance. The automatic parsing of her situation according to its practically significant aspects is accomplished in virtue of her history of emotionally-saturated embodied interactions with related chess situations. Repeated satisfactions of exploiting similar holes in similar defenses, and horrors of having similarly-structured defenses devastated by similarly-positioned bishops, have reconfigured her body schema – her habits of affective, autonomic and motor response – in a way that determines the perspective she adopts on the situation.<sup>10</sup>

This sketch of the logical geography of Dreyfus's work on embodied skill brings its relevance for the philosophy of education into view. According to Dreyfus's Merleau-Pontian vision, affect-laden embodied interactions are crucial not only for paradigmatic motor skills, but for capacities that might intuitively be classified as rational, detached, or contemplative (such as chess-playing). Alternatively put: the contrast between motor skills and rational, detached contemplation is undermined, since human rationality and contemplation rest on a pre-reflective sense of the most significant properties and prospects of the problem domain. This pre-reflective sense depends on an embodied and affective relationship to the problem domain in two ways: first, by depending on a history of affect-laden interactions with the domain; second, by manifesting itself in an affective orientation towards the domain's salient aspects that is incarnated in the subject's body schema. For Dreyfus, then, fostering

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<sup>10</sup> A full exploration of the affective structure of learning is far beyond the scope of this paper. In what follows, I refer only to the roles of success-induced pleasure and failure-induced negative affect. It is important to note, though, that this is a substantial oversimplification (see e.g. Rietveld 2008, Morton 2010, Candiotto 2015, Helm 2018).

understanding in *any* domain requires engaging the learner's body and emotions. His worry, we are now in a position to see, is that online learning sidelines these foundational embodied and affective dimensions of understanding rather than spotlighting them.

#### 4. Are Interfaces Impediments?

Let's call the picture of the bodily and affective basis of learning sketched above, and the phenomenology of skill acquisition it involves, the **Merleau-Pontian View** (henceforth **MPV**). According to MPV, acquiring any new intellectual capacity consists in acquiring new embodied skills. Our intellectual capacities are grounded in a pre-reflective grasp of the significant elements of the situation we are reckoning with, and this grasp is in turn grounded in a bodily-affective orientation to the situation that results from a history of affectively salient interactions. If embodied skills can't be acquired online, then the scope of online learning is restricted to acquiring rigid habits or isolated bits of factual knowledge. Should we embrace this pessimistic conclusion?

It might seem evident that online learning fails to engage the bodily and affective capacities emphasized by MPV. Instead of being in the physical presence of an educator who incarnates and demonstrates the material to be learned, students sit and stare at a screen. Instead of actively engaging with the material being taught through questioning, clarifying, or challenging, students passively consume pre-constructed resources supplied to them. In many places, Dreyfus writes as if this questionable conception of online learning as passive, dispassionate, and disengaged is implicitly guiding his critique. In an early summary statement of his concerns, for example, he writes:

[W]e should remain open to the possibility that, when we enter cyberspace and *leave behind our emotional, intuitive, situated, vulnerable, embodied selves* [...] we might, at the same time, necessarily lose some of our crucial capacities: our ability to make sense of things so as to distinguish the relevant from the irrelevant, our sense of the seriousness of success and failure that is necessary for learning... (Dreyfus 2008, pp.6-7, emphasis added)

But things can't be quite this simple. According to MPV, truly 'leav[ing] behind our emotional, intuitive, situated, vulnerable, embodied selves' is impossible – as we saw above, all perceptual and conceptual understanding is, for Dreyfus, built on embodied, embedded and affective foundations. This foundational role means that our embodied, affective grip on our situation is not a dispensable feature of our relation to the world that can be checked at the door when we go online. If our current set of bodily and affective skills and dispositions cannot simply go missing when we go online, a more plausible challenge is that they might not have the same purchase in online and offline environments. In face-to-face conversation, for example, our understanding of our interlocutor's meaning is automatically shaped by our sensitivity to postural, gestural, prosodic and contextual cues. As we all know, some of these cues are missing in non-face-to-face encounters, and this presents challenges. It becomes easier to talk out of turn, or to misunderstand the communicative intent or context of your interlocutor.

In broadest terms, then, the most plausible motivation for Dreyfus's skepticism about online learning is the claim that our standard portfolio of embodied and affective skills is unfit for purpose when it comes to conveying or fostering understanding via online channels. In a moment, we will critically examine some specific proposals from Dreyfus about what might be lacking in online learning. First, though, it's important to note the foundational role of *plasticity* in Dreyfus's view of the way in which embodied

skills put us in touch with meaningful situations. We have already seen that the skills and habits that constitute our grip on the significance of our situation are often built up by repeated bodily and affective interaction, rather than innately given. But this plasticity extends to the possibility of relating to the world via tools, artefacts, and interfaces. In his initial description of how our body schema shapes our experience, Merleau-Ponty famously uses the example of a blind man perceiving his environment via exploration with a cane:

The blind man's cane has ceased to be an object for him, it is no longer perceived for itself; rather, the cane's furthest point is transformed into a sensitive zone, it increases the scope and the radius of the act of touching and has become analogous to a gaze. (Merleau-Ponty 2012, p.144/178)

Shortly thereafter, he summarises: 'Habit expresses the power we have of dilating our being in the world, or of altering our existence through incorporating new instruments' (Ibid. p.145/179). Ending the same chapter, he concludes:

The body is our general means of having a world. Sometimes it restricts itself to gestures necessary for the conservation of life, and correlatively it posits a biological world around us. Sometimes, playing upon these first gestures and passing from their literal to their figurative sense, it brings forth a new core of signification through them – this is the case of new motor habits, such as dance. And finally, sometimes the signification aimed at cannot be reached by the natural means of the body. We must, then, construct an instrument, and the body projects a cultural world around itself. (Ibid. pp.147-8/182)

In these passages Merleau-Ponty emphasises the distinctive way in which incorporating instruments and cultural artefacts into our interactions with the world can transform the range of possible meanings and significations that can show up for us. There are phenomena that are imperceptible and incomprehensible without appropriate skills with (for example) cars, microscopes, or keyboards. As we acquire automatic and unthinking facility in achieving our purposes through these instruments, the range of meaningful properties and possibilities that we can experience expands.

Several places in Dreyfus's work on skill show sensitivity to this important point. His favourite example, chess perception, itself involves interacting with the meaningful properties of one's situation via a particular set of artefacts with culturally-inculcated significance. Far from being a barrier to the direct perception of threats and opportunities in the chess domain, the chess board and pieces are the medium through which they are perceived. Consequently,

Chess grandmasters, engrossed in a game, can lose entirely the awareness that they are manipulating pieces on a board and see themselves rather as involved participants in a world of opportunities, threats, strengths, weaknesses, hopes, and fears. (Dreyfus & Dreyfus, 1986, p.30)

Revealingly, Dreyfus & Dreyfus then clarify this immediacy by noting that:

When playing rapidly, [grandmasters] sidestep dangers in the same way a teenager, himself an expert, might avoid missiles in a familiar video game, or as we avoid familiar obstacles when we dash to the phone. (Dreyfus & Dreyfus (1986), p.30)

In virtue of an appropriate history of embodied and affective interactions with a virtual environment through the interface of screen and controller the skilled gamer comes to directly perceive and act upon their virtual situation in terms of the dangers and opportunities present in it. Similarly, Dreyfus & Dreyfus claim that skilled air-traffic controllers come to experience themselves as perceiving and acting upon airborne planes rather than moving dots on a monitor display (ibid, p.31). This choice of illustrative examples of skill acquisition reshaping the range of meanings which we can directly experience shows that Dreyfus's views do not rule out the possibility of meaning and significance being conveyed or perceived through a computer interface. Instead, his views can be illustrated and clarified through appealing to this phenomenon. Just as visually impaired people can expand the range of perceptible properties to which they are sensitive by reworking their body schema to incorporate a cane, Dreyfus's teenagers and air-traffic controllers acquire new systems of bodily and affective habits that afford direct experiential contact with threats and opportunities that can only be revealed via the medium of the technology they are using.

There is thus no quick inference from accepting MPV to dismissing online education. The habits of interaction which disclose significant aspects of our environment are pervasively plastic, to the extent that we can incorporate tools, artefacts and interfaces into those habits. An interface such as a computer screen, keyboard, or chess set can function as the medium through which significance is revealed to a suitably skilled individual, rather than an impediment that blocks them off from this significance. This opens up the possibility of agreeing with Dreyfus that learning consists in cultivating a bodily and affective relationship to the target domain, without ruling out the possibility that such cultivation can take place via online education.

### 5. *What's Lacking in Online Learning?*

MPV holds that the bodily and affective basis of understanding is both *pervasive* and *plastic*. It is *pervasive* because, if MPV is right, all our acquired abilities to flexibly and fluently cope with some problem domain depend on present details of our body schema that have been configured by a history of past affectively charged interactions. It is *plastic* because, as we have just seen, our body schemas are always capable of reconfiguration and renewal, including in ways that allow us to directly experience significance via the medium of a tools or interface. Given the above, we currently have no reason to deny that the body schema could be shaped and transformed by interacting with educational resources (including teachers and learners) online. A principled critique of online learning, then, must proceed by identifying particular *ways in which* the body schema resists transformation in ways relevant for important educational purposes.

Dreyfus's clearest motivation for skepticism about online learning is pessimism about whether the kind of *affective engagement* necessary for progressing from competence to proficiency (§2, §3, above) can be fostered in the absence of the embodied presence of teachers and other learners. He makes several suggestions about important ways in which the embodied presence of teachers and learners functions as scaffolding for the affective reactions that learning, according to MPV, aims to inculcate. The first concerns the importance of *risk* in the learning environment:

In the classroom and lecture hall... there is the possibility of taking the risk of proposing and defending an idea and finding out whether it fails or flies. If each student is alone in front of his or her computer then there is no place for such risky involvement.

(Dreyfus 2008, p.33)

There is an important insight here, but no entailment of the pessimistic conclusion – a pattern we will see throughout this section. Given MPV, Dreyfus is right to attend to the affective dimensions of the learning environment, and to note that online and offline environments might differ importantly in this respect. But why suppose that there is *no* place for risky affective involvement on the part of an online learner? Most readers will have had the experience of being emotionally engaged by the solitary reading of an online article – excitement at glimpsing new theoretical possibilities, pleasure at finding new theoretical affinities, unease or surprise occasioned by skillful undermining of the credentials of a favorite view or framework. According to MPV, such emotional reactions partly determine what we learn from our reading. But being in the embodied presence of a teacher and classmates is not necessary to have one's affective reactions shaped by the learning material: good prose can do this, as can well-presented and produced recorded content.

Caution is required here, however. We cannot infer from the fact that you or I are affectively engaged by the solitary consumption of a particular journal article or online lecture that everyone else will be engaged likewise. My habits of affective response to reading and viewing material have been reshaped by years of interaction with an academic community. Patterns of praise and censure from tutors, markers, supervisors, reviewers and peers have molded my automatic responses to specific forms of inference, modes of expression, and types of theory. Due to these affect-laden interactions I can sometimes, for example, grasp the conceptual or inferential structure of a paper or presentation without explicitly deliberating about it. Just as the chess player's history of interactions allows them to automatically adopt a perspective on their situation that structures and constrains their deliberation, my history of academic interactions allows me, on a good day, to automatically perceive a paper or argument as having a particular structure, motivation, or trajectory, and to experience its various details as salient or peripheral in this light. Two points, then, are important here. First: the *plasticity* of the body schema emphasized in the previous section means that embodied interaction with a teacher need not be the only way to grasp the significance of learning material. MPV allows that significance can also be grasped via the medium of a computer interface or printed page. Second: this grasp itself, however, depends on the *pervasive* influence of the skills and history of interactions the learner brings to the table. No learner, online or off, is a blank slate – words, concepts, modes of expression and delivery will already have particular affective resonances for each of them. The challenge for educators is thus to draw on the palette of existing bodily capacities and affective resonances that each learner brings to the table in a way that inculcates the patterns of bodily and affective response on which proficiency and expertise in a particular domain depend.

The pervasive and plastic way in which bodily affective habits shape our understanding thus gives us no reason to think that affective engagement must be lacking in online learning. Nonetheless, Dreyfus goes on to suggest that a *specific kind* of potential for risky affective engagement is missing in most online learning – that which comes with expressing new or unfamiliar ideas in the embodied presence of peers and a teacher. The passage quoted above continues:

even if we... suppose that the students are all watching the professor at the same time, as with interactive video, and everyone watching hears each student's question, each student is still anonymous and there is still no class before which the student can shine and also risk making a fool of himself. The professor's approving or disapproving response might carry some emotional weight, but it would be much less intimidating to

offer a comment and get a reaction from the professor if one had never met the professor and was not in her presence. (Ibid.)

This observation also directs our attention to an important feature of learning environments – the role that actual and potential interactions within a community of learners, and between learners and teachers, play in shaping the affective trajectory that MPV makes central to learning. However, the claim that such shaping can't occur online once again lacks bite – the interface of computer monitor or printed page need not block us off from the affectively significant properties of the learning domain. Many readers will have had the experience of being emotionally affected by something they have said or done, or something said or done to them, online. While the experience of contributing to an online discussion might often be less emotionally fraught than that of contributing to an offline discussion, this will vary among learners. And even if online questions or discussions are in general less affectively charged than offline counterparts, we saw above that we have no reason to suppose that online environments eliminate the affective properties that MPV requires for learning to occur – the pleasure of success and negative affect of failure. Again, then, instead of providing reasons to dismiss the possibility of online learning, MPV highlights features of the learning environment to which online educators should attend. Dreyfus is right to point out that the physical and interpersonal structure of the environment can provide important scaffolding that supports the nascent affective capacities and dispositions involved in understanding a particular domain. The challenge for online educators is to ensure that online learning environments scaffold the same affective reactions.

The final kind of affective scaffold that Dreyfus emphasizes is the embodied presence of a teacher who expresses a particular affective orientation to the learning domain. As we stressed above, there's no guarantee that the competent performer will come to feel they have an emotional stake in the schema they adopt, or the resultant outcome – yet MPV holds that acquiring this emotional stake is crucial to developing proficiency. Dreyfus suggests that the embodied presence of a good teacher can help here. Good teachers perceptibly care about their subject matter and their students. Their students can see or hear the way in which they are emotionally engaged with the material they are teaching and, in the best cases, this engagement is infectious:

If the teacher is detached and computer-like, the students will be too. Conversely, if the teacher shows his involvement in the way he pursues the truth, considers daring hypotheses and interpretations, is open to students' suggestions and objections, and emotionally dwells on the choices that have led him to his conclusions and actions, the students will be more likely to let their own successes and failures matter to them, and rerun the choices that led to these outcomes. (Dreyfus 2008, p.31-2)

Given MPV, Dreyfus is right to highlight the way in which good teachers can embody the affective orientation towards a domain which they aim to inculcate in learners, and to suggest that automatic interpersonal processes of empathy and emotional resonance (Guadagno et al 2013, Zahavi 2015) can scaffold the learning process. But, as we have seen, the plasticity of the body schema permits our experience to be shaped by the affectively salient properties of a domain via the medium of monitor or printed page. We have all had experiences of being affectively stimulated by enthusiastic or charismatic presenters or authors, as well as being stultified by dull or detached ones, and know how this can shape our own learning – but the embodied presence of these presenters or authors isn't necessary for this shaping to occur. Once again, then, the challenge for online educators is to understand the affective structure involved in mastering a particular domain, and attempt to design pedagogical resources and

methods that inculcate that structure by drawing on the pervasive habits of bodily and affective response that learners already possess.

Dreyfus, I have argued above, fails to motivate his claim that online learning is incompatible with the affective engagement emphasized by MPV. Nonetheless, I think that MPV does suggest some important limits of online learning – many modes of online pedagogy are incompatible with certain *interactive dynamics* which are beneficial for learning according to MPV. I focused above on arguing that the technology that mediates online learning need not be a barrier to the learner's perception of affective significance and structure of the learning resources. But, as Dreyfus noted above, good teaching is a *two-way* interaction – as well as attempting to shape the learners' affective and interactive habits toward the subject matter, good teachers allow their own activity to be shaped in real time by the reactions of learners. Given that the teacher's task, according to MPV, is to reshape learners' habits of bodily and affective response in a way that builds on the existing structure of their body schema, teachers in the embodied presence of learners have the advantage of immediate interactions that yield important information about how this reshaping is progressing. Skilled teachers automatically tailor their performance to the mood in the room – their sensitivity to the bafflement, boredom, or rapt attention of their audience informs the pace and level of detail at which they proceed. When explaining a point at which the learners should feel confused, excited, or conflicted, teachers in the embodied presence of students can choose to expand, redescribe, or backtrack until they perceive the appropriate mood. This dynamical and bespoke tailoring of teaching to learners' affective reactions is difficult in a live online seminar, and impossible in written or recorded content. Nonetheless, while this might represent a *limitation* of online learning, it does not support Dreyfus's conclusion that online learning cannot bring about the reshaping of the body schema which MPV emphasises. According to MPV a skilled teacher is one who has had their own habits of expression and explanation shaped by affect-laden classroom interactions – and this history of interactions should be reflected in the way online learning resources are constructed. While a pre-recorded online lecture can't be tailored to the reactions of the learners watching it, its structure and delivery can nonetheless be informed by the teacher's history of past interactions with learners, in a way that optimizes the likelihood of its having the relevant body schematic effects.<sup>11</sup>

A second set of potential limitations of online learning raised by Dreyfus's critique concerns the way in which interactive dynamics can foster *engagement with* and *commitment to* the learning process. Above I argued that MPV does not entail that learners are blocked off from the affective significance of the subject matter. But it is plausible that the embodied presence of other learners can help make the appearance of that significance more salient. The affective reactions of those around you are often perceptible and contagious. If you missed the fact that the most recent part of a presentation should have made you feel baffled or awestruck, then the perceptible reactions of your peers can help you pick up on this, and nudge you towards sharing that affective state via automatic empathic processes. The presence of, and interaction with, other learners and an institutional setting might also foster *commitment* in a way that MPV makes important for learning. Recall that feeling responsibility for, and emotionally

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<sup>11</sup> Here the important recent work of Michelle Maiese (2013, 2017) deserves mention – drawing on Dreyfus and the enactivist notion of participatory sense-making (De Jaegher & Di Paolo 2007), Maiese argues that certain educational goods such as 'transformative' learning experiences can only take place in virtue of interactive dynamics that can only obtain between embodied subjects in real-time interaction. We might attempt to apply the line of response to Dreyfus's concerns I present here to Maiese's critique – since the way in which the body schema, according to MPV, shapes our experience is pervasive and plastic, there might be more than one way to shepherd suitably skilled learners through the sequence of affective states constitutive of transformative learning experiences. Fully articulating this possibility and doing due justice to the nuances of Maiese's position is, however, beyond the scope of this paper.



engaging with, one's successes or failures in a domain is a prerequisite of moving from competence to proficiency (§2, §3). Much on-campus learning takes place at set times, in particular places with culturally inculcated significance, and in the presence of committed peers who are jointly engaged in a shared project. Each of these features might constitute a helpful motivational and affective support for committing to and engaging with the learning process (Heath 1998). For each of the above points, I think the appropriate response is to concede limitations of online learning and attempt to mitigate these in course design. Because the embodied presence of other learners can signal-boost the affective salience of the subject matter in on-campus learning, online courses should lean harder on the ways in which affective salience *can* be conveyed in online learning, attending closely to pacing, structure, delivery, and other expressive qualities of the learning material and their potential effects. Where a particular affective disposition is thought to be essential to understanding in some domain, more time should be spent attempting to inculcate and nurture that disposition in an online course than in an offline counterpart. And while the particular motivational props and scaffolds suggested above do not translate perfectly to online courses, course designers should consider how to build in effective analogues – if set learning times and culturally-inculcated significance of learning environment are thought to make important contributions to learner commitment and engagement, then course designers can attempt to structure, design and present learning materials appropriately in light of this. Recent research within the 'Community of Inquiry' framework (Garrison & Akyol 2013) contains many important suggestions about how interactions and commitment can be fostered among communities of online learners, and has demonstrated tight links between online engagements with course material, instructor and peers (Kozan and Richardson 2014). Once again, then, MPV does not allow us to infer that online learning is impossible. It does, however, yield clear suggestions about online learning's potential limits, and recommendations about how these limits can be mitigated via appropriate course design and delivery.

### **Conclusion: The Imponderable Bloom**

'She could see the image of her son, who lived on the other side of the earth, and he could see her... "I see something like you, but I do not see you. I hear something like you through this phone, but I do not hear you." The imponderable bloom, declared by discredited philosophy to be the actual essence of intercourse, was ignored by the machine.'  
(E.M. Forster, 'The Machine Stops', quoted in Dreyfus (2008), p.49)

Dreyfus, like many technological skeptics, quotes the above passage from E.M. Forster's prescient short story in the context of his case against the possibility of online learning. I have argued that this case is overstated – Dreyfus's Merleau-Pontian vision is not only compatible with the possibility of online learning, but enables us to get a clearer view of its scope and the pedagogical challenges it raises. This is, I suggest, the real value of his critique. Talk of imponderable blooms is of no use to those attempting to understand the contributions that embodied and emotional engagement makes to learning. Ironically, Dreyfus's contribution is a framework which renders the structure and importance of these engagements thoroughly ponderable. According to that framework, dubbed MPV above, the flexibility and generality characteristic of genuinely understanding a given domain is underwritten by a system of bodily and affective habits and dispositions which conspire to allow skillful perception of and interaction with the domain's salient aspects. But attending to MPV's roots in Merleau-Ponty's *Phenomenology* and Dreyfus's account of skill acquisition shows that MPV allows the perception of affectively salient properties via a monitor or printed page.

According to MPV as I have depicted it, those engaged in online teaching and course design are faced with the task of identifying the bodily and affective dispositions constitutive of understanding in a

particular domain and designing learning materials that are maximally likely to reshape the existing bodily and affective responses of learners in the requisite way. Talk of education as the shaping of bodily and affective response sounds esoteric. But, if MPV is right, it simply provides a perspicuous way of describing the things that good educators already do. Anyone who has been either a teacher or a learner knows that the best teaching is more than a dispassionate recital of facts, or establishment of claims. Good teachers enact what they teach, expressing ideas and claims in bodily and verbal ways that reflect the manner in which they are inviting their students to engage with the topic at hand. This affective and expressive dimension of teaching is pervasive, not confined to subjects where emotions are most conspicuously in play. Hwang & Roth (2011), for example, catalogue ways in which expressive patterns of gesture, intonation, and movement around the teaching space contribute to the explanation of concepts in thermodynamics, while Alibali & Nathan (2012) survey the gestural patterns used to inculcate and express mathematical concepts. Rather than requiring a sea change in teaching practices, MPV places the bodily and affective dimensions of existing practice at center stage, and provides a framework within which their nature and importance can be understood.

We saw above that challenges arise in recreating these dimensions online: teaching style and content cannot be tailored to the reactions of specific learners in real time; emotional contagion between learners, and between teacher and class, may be a helpful booster of affective shaping; and other classroom and institutional dynamics might scaffold learner commitment and engagement in important ways. In each of these cases, however, I argued above that MPV suggests ways in which these challenges can be met, rather than reasons for Dreyfus's extreme pessimism. Given that MPV allows that affective salience can be perceived by learners in the absence of embodied interactions, online teaching must attempt to compensate for its limits by leaning harder on the ways in which bodily and affective habits *can* be shaped by online resources. And it must do so in a way informed by careful reflection both on the affective structure of understanding in the relevant domain, and on the existing portfolio of bodily and affective habits that learners bring to the table. Dreyfus is right that MPV affords a useful diagnostic framework for understanding what might be lacking in online learning. But this is cause for optimism – MPV sheds light not on the impossibility of online learning, but on what is required for it to reach its full potential.

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